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Proposals of Innovators Concerning Problems of Using Missile Equipment

1. A device which prevents the 25 atm master manometer from bursting in the event of improper work by the crew members.

(Engineer-Captain I. T. Zubarev and Senior Engineer-Lieutenant Ye. V. Chausov)

The device is an assembly (uzel) (Sketch 1) consisting of a safety valve (predokhranitelnyy klapan), a T-joint (troynik), and an adapter (perekhodnik) with a jet (zhikler).

The safety valve of the device is similar in design to the safety valve of the D-450-2800 reducer (reduktor) and differs only in that in the valve of the device, there are no openings which equalize the pressure between the internal and external cavities (polost) of valve 4 (Sketch 1). This is necessary in order to exclude the possibility of self-vibration arising, i.e., the vibrating action of the valve's operation.

The T-joint of the device is similar in design to the 9100-00 T-joint, but in connecting the master manometer to the T-joint of the 9100-260 device, it is necessary to use two AU 320-000 hoses.

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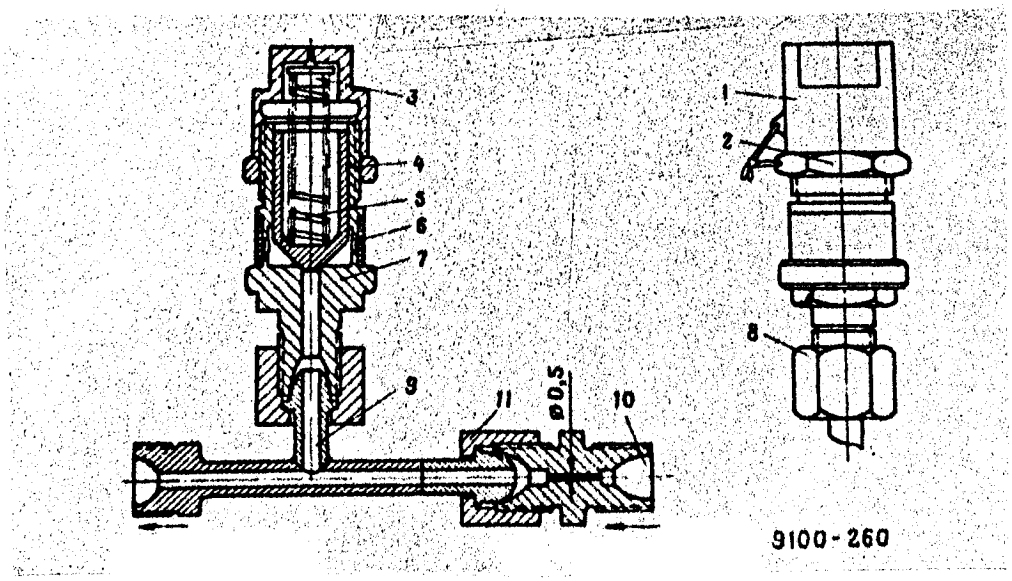

Sketch 1. The device which maintains the master manometer at 25 atmospheres. 1-cap; 2-lock-ring (stopornoye koltso); 3-regulator bushing (napravlyayushchaya vtulka); 4-valve; 5-spring; 6-protective rubber ring; 7-safety valve housing; 8-cover nut (nakidnaya gayka); 9-connecting T-joint (troynik sbornyy); 10-adapter with jet; 11-cover nut.

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The adapter with the jet is similar in design to the 9100-0 adapter and differs only in that the internal diameter of the device adapter is decreased to 0.5 mm. The necessity for installing a jet is brought about by the fact that in the absence of it, as an experiment showed, the safety valve begins to function in a vibrating manner, with the result that the manometer cannot be guaranteed against bursting. The jet plays the role of a damper (dempfer) which equalizes the pressure of flow. The jet diameter was selected by experimenting.

The following materials can be used for the manufacture of the above-listed parts of the device: for the regulator bushing (3), the safety valve housing (7), the cover nut (8), the adapter with jet (10), and the cover nut (11) - steel 45; for the cap (1) and the lock-ring (2) - steel ST-10; for the spring (5) - steel 60. Valve (4) can be made of bronze BrAZh9-4 (Sketch 1).

The operation of the device which keeps the 25 KG per square centimeter manometer from bursting is shown in Sketch 2.

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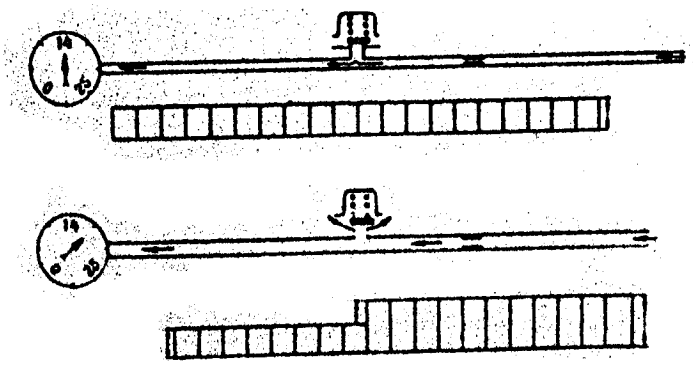

Sketch 2. Diagram of the Operation of the Device.

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2. Stationary Regenerating Equipment (ustanovka)
(Technical-Lieutenant V.P. Morozov)

The use of exhaust gases from the stationary diesel electric power station is proposed for drying the adsorbers of the 8G33 mobile compressor station.

The exhaust gases are brought by a specially built elbow joint (koleno) to a drying case where four adsorbers are located. The adsorbers are heated and, simultaneously with this, compressed air, which is preheated in a coil, is blown through. The compressed air is taken from bottles (ballon) filled to a pressure of 150-200 atmospheres.

The drying case is made of angle and sheet iron.

The proposed method of restoring (regenerating) the adsorbent permits maintaining the 8G33 assembly (agregat) in constant combat readiness and significantly decreases wear and tear on its engine (motoresurs).

3. The Use of the "Raketa" Vacuum Cleaner (pylesos) for Checking the Hermetic Sealing of Missiles
(Technical-Lieutenant A.I. Cherkasov)

It is proposed to execute a check of the hermetic sealing of a missile and its pressurization (nadduv) with the "Raketa" vacuum cleaner.

For this, one can use a jar with a diameter of 200 mm, in the bottom of which it is necessary to make a number of holes. The jar is filled with silica gel and is inserted inside the vacuum cleaner against the air intake. An adapter is made for joining the vacuum cleaner hose to the openings in the covering of the missile (izdeliye).

4. An Instrument for Checking the Insulation Resistance of the Integral (bortovoy) Cable Circuit (BKS) of the R-12 Missile
(Senior Engineer-Lieutenant A.A. Matveyev)

The instrument for checking insulation resistance (PPS-2M) is intended for checking the insulation resistance between contacts ShPG4 (1-ShPG4/2) and ShRI and between contacts ShNSA, ShNSK, ShRI26, ShPG4/2 (ShPG3/1), ShPG4/2 (ShPG3/2), ShRI /GShRI (GShRA), GShR2 (GShRB)/* and the body of the missile (izdeliye), and also

* Brackets as in original.

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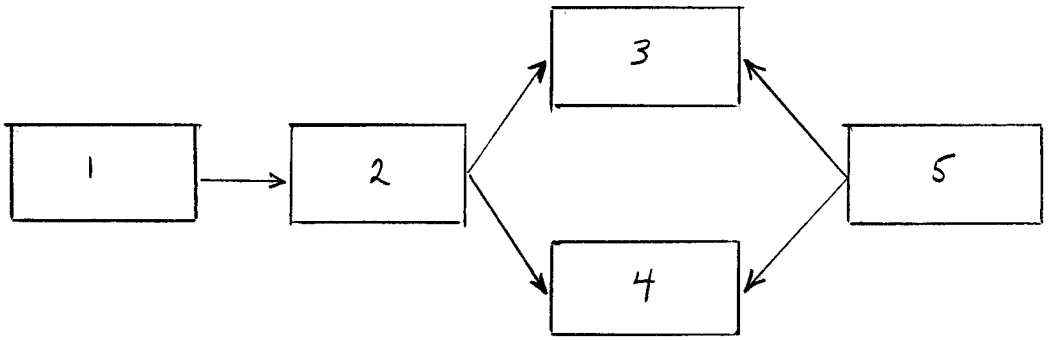
for checking the integrity of the circuits between contacts (ShPG3/1 - ShPG4/1, ShPG3/2 - ShPG4/2, ShRI-GShR1 (GShRA), GShR2 (GShRB); ShNSA, ShNSK).



Sketch 3. Unit diagram of the instrument for checking the insulation of the integral cable circuit of the R-12 Missile.

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1. A switch unit (blok pereklyuchateley) designed for the commutation of the BKS circuits being checked in the course of checking the insulation resistance and the integrity of the circuits. It is made up of two switches. The first is a two-panel, 20 contact switch. The second switch is a single-panel, 20 contact one.

2. The commutation unit (blok). Designed for connecting the megohmmeter unit and the ohmmeter unit to the switch unit in checking the insulation resistance and the integrity of the BKS circuits. It has seven TV-1 breakers.

3. The megohmmeter unit. Intended for measuring the BKS insulation resistance magnitude. An IP1 measuring instrument and a direct current amplifier are included in it.

4. The ohmmeter unit. Intended for integrity checking of the BKS circuits. An IP2 measuring instrument is included in it.

5. The power supply unit. Intended for:

--supplying power to the imput and output circuits of the direct current amplifier in the megohmmeter unit;

--supplying power to the IP2 measuring instrument in the ohmmeter unit, which includes the following: a direct current source with a voltage of 1.6 v. for supplying power to the output circuit of the direct current amplifiers in the megohmmeter unit and the IP2--in the ohmmeter unit; a direct current source with a voltage of 4.8 v for supplying power to the voltage transformer (preobrazovatel) which is hooked up to the transistorized (poluprovodnikovyy) instruments. The voltage from the transformer output is used to supply power to the input circuit of the direct current amplifier of the megohmmeter unit.

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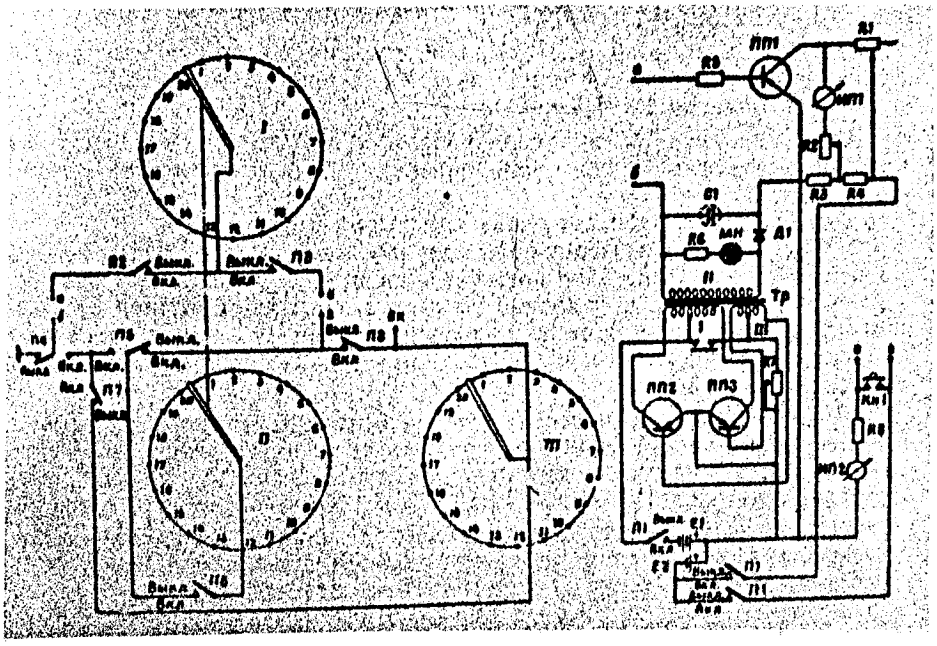

Sketch 4. Basic Electrical Diagram of the Instrument for Testing the Resistance of the R-12 Missile Integral Cable Circuit.

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The basic electrical diagram of the instrument is drawn in Sketch 4. The following symbols are used in the diagram:

--I, II, III - unit of switches; I and II - the panel of the two-panel switch; III - panel of the single-panel switch:

--P2, P3, P4, P5, P6, P7, P8 - toggle switches (tumbler) of the commutator unit;

--PP1 - transistorized instrument;

--IP1 - megohmmeter unit measuring instrument;

--R1, R2, R3, R4, R5 - megohmmeter unit resistors, /Roman "R"/;

--IP2 - ohmmeter unit measuring instrument (KN1-button 8-resistor);

--Ye1 - direct current source with a voltage of 4.8 v;

--Ye2 - direct current source with a voltage of 1.6;

--PP2, PP3 - transistorized devices (TR-transformer--transformator); R7-potentiometer;

--P-1-toggle switch; KN1-button; MN-neon tube;
--R6 - resistor; D1-germanium diode; C1-electrolytic condenser - voltage transformer for the transistors);

The lamella contacts of plate (plata) I are hooked to a 20-contact plug connector of the A-type (II), which is mounted on the wall of the instrument, and the lamella contacts of plate II - to a similar plug connector (I), also mounted there. The lamella contacts of plate III are connected to a 20-contact plug of type A(III) and (II).

By means of toggle switches P2 and P8, the hook-up of the megohmmeter or the ohmmeter to the cursors (dvizhok) of switches I, II or III, depending on the check-out being conducted, is provided for.

The megohmmeter unit works in the following manner.

By turning on toggle switch P1, the voltage Ye2 is applied positively to the emitter, and negatively through R2 and IP1 -- to the collector.

To calibrate the IP1 measuring instrument scales, it is necessary to turn on the voltage transformer after having pressed and released the KN1 button. With the releasing of the button, the MN lamp must light up, signaling that the transformer is working normally.

The voltage must be on the order of 100 v in the C1 condensor.

By connecting the standard resistors (100 megaohms ÷ 1 kiloohm) with the direct current amplifier inlet, the scale IP1 is calibrated.

The R1 potentiometer serves to set the arrow of the IP1 in the ∞ position when the inlet is open.

The R2 potentiometer is used for altering the sensitivity of the IP1. Its magnitude is taken once during instrument setting.

The R3 and R4 resistors are the voltage dividers.

The R5 resistor is designed to prevent stoppage in case of short-circuiting (zakorachivaniya) in the direct current amplifier input.

The ohmmeter unit works in the following way:

By turning on the P1 toggle switch, the Ye2 voltage goes through IP2 and R8 to points v and g. On pressing the KN1 button, the instrument arrow must stop in a short-circuited position, and on releasing - in the ∞ position. In connecting the resistors, standardized at 15 and 20 ohms, to points v and g, the IP2 arrow is set at the 15 and 20 ohm marks, respectively.

In the course of checking the integrity of the circuits and the magnitude of the BKS circuit resistance, the IP2 instrument arrow will register a short circuit or will be

located in the 15 to 20 ohm sector, respectively. The R8 resistor is standardized (kalibrovochnoye).

One 1.6-FMTs-U-3.2 element in the megohmmeter unit is used for supplying power to the output circuit of the direct current amplifier. This element is also used for the work of the ohmmeter. The current consumed by the work of the megohmmeter is not more than 10 milliamperes, (ma) and that consumed in the ohmmeter's work is not more than 130 milliamperes.

For supplying power to the transformer, three 1.6-FMTs-U-3.2 elements, connected in series, are used. The current from the power supply source consumed by the transformer is not greater than 350 milliamperes. The alternating voltage output from the secondary coil of the converter is applied to condenser C1 through rectifier D1. The condenser, in each positive half cycle of output voltage, is recharged. The direct-current voltage on its plates is equal to approximately 100 volts.

Instrument Checkout Console (Sketch 5)

Structurally, the console is made in the form of a laminated (getinaksovaya) panel, with attached brush-type (shchetochnyy) switches I-II and III; measuring instruments IP1, IP2, toggle switches (tumbler) P1, P2, P3, P4, P5, P6, P7, P8; button KN1 and the potentiometer R1 (zero setting).

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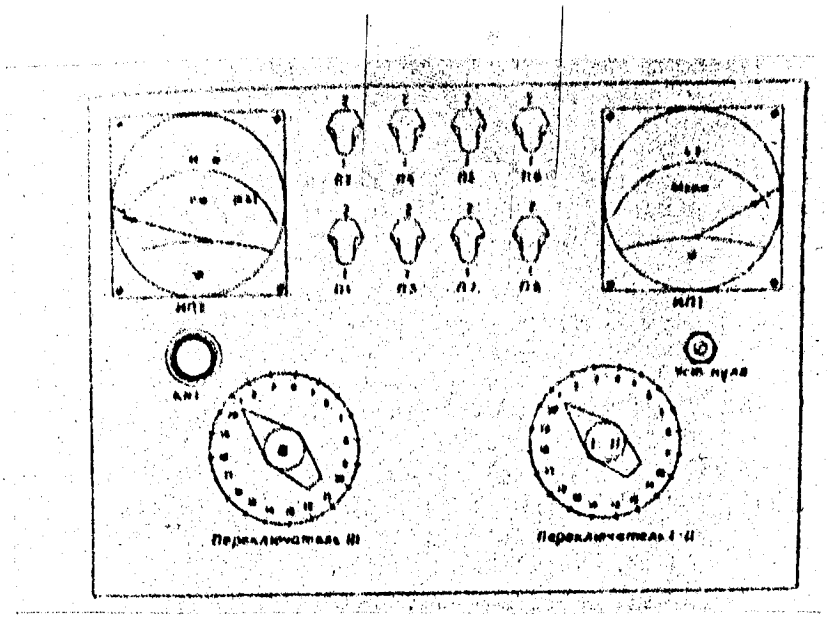

Sketch 5.

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The megohmmeter unit and the voltage converter are mounted on a 100mm x 50mm laminated plate which is firmly attached to the front panel of the console.

The front panel is a hinged lid of the chassis of the instrument. The dimensions of the instrument are 300 x 200 x 120 mm. The sources of power (four 1.6-FMTs-U-3.2 elements) are attached to the very bottom of the chassis. There is an opening through which it is possible to replace the power source elements. Two twenty-strand cables are supplied with the console (Sketch 6).

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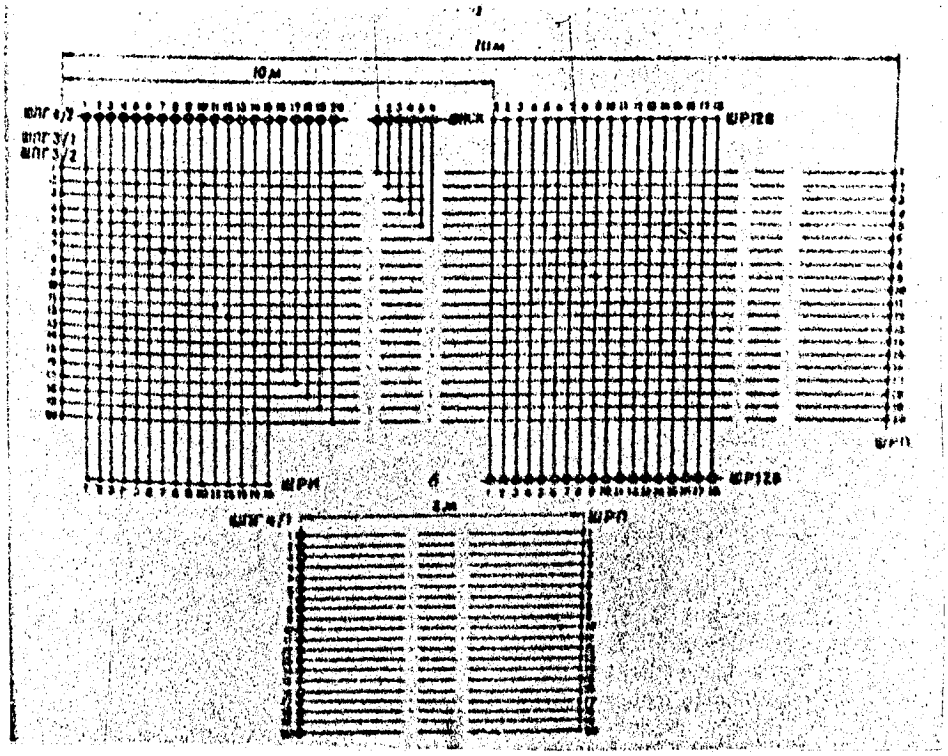

Sketch 6.

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1. The console connecting cable is ShRP(plug) - ShR126 (plug), ShR126 (socket), ShPG3/1(ShPG3/2) (plug), ShPG4/2 (socket), ShRI (plug), ShNSAK (plug).

The plug type connector II (plug) is connected to the console (ShR2) during the check-out, and the remaining plug connectors are connected to the appropriate BKS plug connectors for a particular check-out. The cable length is 20 m.

2. The auxiliary cable is ShRP (plug) - ShPG4/1 (rocket). The plug connector II is connected to the console (ShR1) during the check-out of the insulation resistance between contacts ShPG4/1 and ShPG4/2 and the plug connector ShPG4/1 (socket) is connected to the BKS of the missile (izdeliye). The auxiliary cable is 2 meters long.

Checkout of Insulation Resistance and Integral Cable Circuit Network Integrity

Checkout of the Working Condition of the Console:

--press button KN1 - the ohmmeter arrow IP2 registers 3;

--release button KN1 - the arrow registers ∞ ;

--turn on toggle switch P1;

--by adjusting "Setting O" set the arrow IP2 in the ∞ position;

--press button KN1 and release;

--when releasing button KN1, the MN light must light up (if it does not light up, then check by pressing 3 to 5 times). Turn off toggle switch P1, MN light goes out.

Checkout of the Integrity of the Connecting and Auxiliary Cables

1. Connect the plug connector of the connecting cable ShRP to ShR2 of the console and connect ShPG3/1 (ShPG3/2) to ShR1.

2. By turning the console switch (I,11) from position 1 to position 20, check the circuit integrity (the arrow of IP2 must be in the short-circuit position).

Disconnect ShPG3/1 (ShPG3/2) from the console and connect it with ShPG4/1 of the auxiliary cable. Connect the ShRP of the auxiliary cable to ShR1 of the console. Repeat operation 2. Disconnect the plug connectors ShPG3/1 (ShPG3/2) and ShPG4/1.

Insulation Resistance Checkout Between Contacts ShPG4/1 and ShPG4/2

1. Connect the ShPG4/2 of the connecting cable and ShPG4/1 of the auxiliary cable to ShPG4/2 and ShPG4/1 of the BKS respectively.

2. Turn on toggle switches P2, P4, P5, P6.

3. Turn on the voltage converter.

4. By turning the handle of the switch (I,II) from position 1 to position 20, check the insulation resistance on the IP1. The norm is not less than 0.5 megaohms.

5. Disconnect ShPG4/1 and ShPG4/2 from the BKS.

6. Disconnect the ShRP of the auxiliary cable from the console.

Checkout of the Insulation Resistance Between Contacts ShNSA, ShR126, ShNSK, ShPG3/1 (ShPG4/1), ShPG3/2 (ShPG4/2) ShRI and the Body of the Missile and Also Circuit Integrity between ShRI - GShR1 (GShRA), GShr2 (GShRB) and ShNSAK

1. Connect the BKS ShR126 (socket) of the connector cable to the ShR126 (plug). Turn off toggle switch P4.

2. By turning the handle of the switch (I, II) from position 1 to position 20, check the insulation resistance valve (the norm is not less than 0.5 megaohms).

3. Disconnect the ShR126 (socket) of the connecting cable from the ShR126 (plug) of the BKS.

4. Connect the BKS ShR126 (plug) of the connecting cable to the ShR126 (socket).

5. Repeat operation 2.

6. Disconnect ShR126 (socket) of the connecting cable from the ShR126 (plug) of the BKS.

7. Connect the ShPG4 (socket) of the connecting cable to the ShPG3/1 of the BKS.

8. Repeat operation 2.

9. Connect the ShPG4/2 (socket) of the connecting cable to the ShPG3/2 of the BKS.

10. Repeat operation 2.

11. Disconnect the ShPG4/2 (socket) of the connecting cable from the BKS.

12. Connect the ShR1 (plug) of the connecting cable to the ShR1 of the BKS.

13. Repeat operation 2.

14. Check the insulation resistance between contacts of the ShR1:

--turn on toggle switches P4 and P7;

--turn off toggle switch P5;

--set the switch (III) in position "1", reverse the switch lever (I,II) from position 1 to position 20 while checking the value of insulation resistance (the norm is 0.5 megaohms).

When switches (I,II) and (III) are in the same positions, the IP2 arrow registers a short circuit.

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15. Repeat operation 4 and 14, successively setting switch (III) in positions from 2 to 15.

Checkout of the Integrity of Circuits ShRI - GShR1 (GShRA), GShR2 (GShRB).

16. Connect ShRP of the auxiliary cable to ShR1 of the console, and ShPG4/1 of the auxiliary cable to GShR1 (GShRA) of the BKS.

17. Turn off toggle switches P2 and P1.

18. Turn on toggle switch P3.

19. Check the integrity of the ShRI - GShR1(GShRA) circuits in accordance with the table (see next page).

20. Check the integrity of the circuits on the IP2. The IP2 arrow must register a short circuit.

21. Connect ShPG4/1 of the auxiliary cable to GShR2 (GShRB) of the BKS.

22. Repeat operations 19 and 20. Connect the ShNSAK of the connecting cable to ShNSA of the BKS.

23. Turn on toggle switches P5 and P8.

24. Check the value of the circuit resistance between the ShNSA contacts; for this purpose switch (I,II) is successively turned from position "1" to positions "2", "3", "4".

25. The IP2 arrow must be located in the 15 to 20 ohm sector while this takes place.

26. Disconnect the ShNSAK of the connecting cable from the ShNSA of the BKS and connect it to the ShNSK of the BKS.

Connector	Number of Contacts														
ShRI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GShR	14	15	16	17	-	-	-	-	19	18	7,8	-	-	20	4
GShRA	-	-	-	-	-	-	-	-	-	-	7,8	-	-	-	-
GShR2	-	-	-	-	17	16	15	14	19	18	-	9,10	20	-	4
GShRB	-	-	-	-	-	-	-	14	-	-	-	9,10	-	-	-

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27. Repeat operations 24 and 25.

Checkout of the Insulation Resistance Between the ShNSAK Contacts and the Body of the Missile

28. Turn on toggle switch P2, turn on the converter.

29. Turn off toggle switches P4, P3 and P8.

30. By turning the switch (I,II) handle from position 1 to position 6, note the value of the insulation resistance (the norm is not less than 0.5 megaohms).

31. Disconnect the ShNSAK of the connecting cable from the ShNSK of the BKS and connect it to the ShNSA of the BKS.

32. Repeat operation 30.

33. Disconnect the ShNSAK of the connecting cable from the BKS of the missile.

Circuit Integrity Checkout Between ShPG3/1 - ShPG4/1 and ShPG3/2 - ShPG4/2 Contacts

1. Connect the ShPG4/2 of the connecting cable to the ShPG3/1 of the BKS.

2. Connect the ShRP and ShPG4/1 of the auxiliary cable to the ShR1 of the console and the ShPG4/1 of the BKS, respectively.

3. Turn on toggle switch P3.

4. Turn off toggle switches P2, P1 and P5.

5. By turning the handle of switch (I,II) from position 1 to position 20, check circuit integrity with the IP2. The IP2 arrow registers a short circuit.

6. Connect the ShPG4/1 of the auxiliary cable to the ShPG4/2 of the BKS.

7. Repeat operation 5. Set the keys (klyuch) and switches (pereklyuchatel) to the initial position.

About five minutes are required for conducting the listed checkouts.

5. A Stand for Checking Out Electrical Measuring Instruments at a Troop Unit (Voyskovaya Chast) Instrument Inspection Point

To facilitate work and save time, it is expedient to mount all control (reguliruyushcheye) assemblies, converter elements and commutation apparatus, located at the KPP (kontrolnyy punkt priborov - Instrument Inspection Point) of a troop unit (voyskovaya chast), on a special stand.

The stand is designed for current with a voltage of 127/220 v and a frequency of 50 cycles per second, and must ensure output currents and voltages as follows:

--alternating voltages up to 600 volts;

--direct voltage up to 600 volts;

--direct current up to 50 amperes;

--alternating current up to 100 amperes.

The main electrical diagram of the stand is given in Sketch 7.

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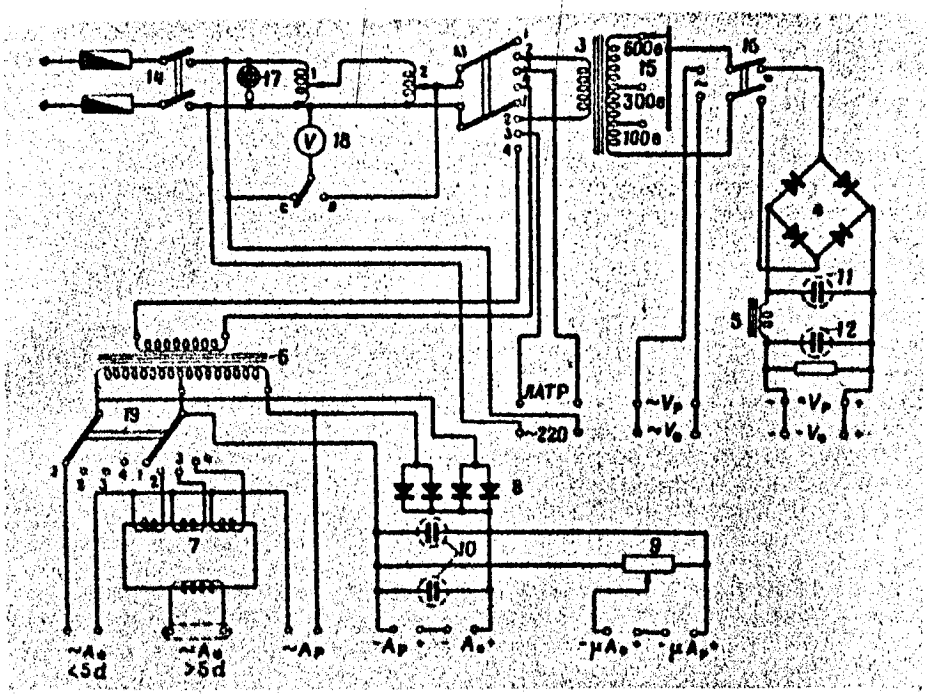

Sketch 7. Main Electrical Diagram of the Stand.

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The key to the diagram is as follows:

1,2 - Mobile-transformer LATR-1;

3 - Voltage transformer;

4 - Voltage rectifier;

5 - Filter choke;

6 - Current transformer;

7 - Instrument (izmeritelnyy) transformer UTT-5;

8 - Current rectifier;

9 - Variable resistor for checking micro-ammeters;

10,11 - Filter condensers;

12 - Resistor for the condenser discharge;

13, 14, 15, 16, 19 - Switches;

17 - Neon tube MN-3;

18 - Voltmeter.

Conducting the Checkouts

a) Checkout of voltmeters

Set switch 13 in position "2", switch 15 - in the position which corresponds to the voltmeter measuring limit, and switch 16 - in the position which corresponds to the type of current.

Set up the corresponding voltage using the mobile-transformers 1 and 2. The readings of the instrument being checked are compared with those of the control voltmeter.

b) Checkout of ammeters

Turn switch 13 to position "4". The ammeters are checked up to 5 amps when switch 19 is in position "1".

The alternating current ammeters with measuring limits greater than 5 amps are checked with instrument transformer UTT-5 (7), to the secondary coil of which it is necessary to connect the 5-amp ammeter. Depending on the position, switch 19 correspondingly supplies the voltage to the 15, 50 or 100 ampere coil of the instrument transformer .

The direct current ammeters are checked at terminals Ap and Ao irrespective of the position of switch 19.

For testing the micro-ammeters, a special rheostat 9 is installed which ensures continuous regulation of the current.

Technical Data for Stand Components

The stand is built in the form of a table-desk. The handles of all regulating elements of the switches and terminal are mounted on the front vertical panel.

Voltage transformer 3 is designed for a 60 watt output The voltage output equals 600 v (There are outlets for 100 and 300 v.), while the voltage input is 220 v.

The core is made of L-shaped, right-angle plates. The cross-section of the core is 7, 7.8 and 8 sq. mm. The area of the window is 14.8 sq. centimeters.

The coils are made of PEL wire. The primary coil d_{iz} = 0.38 mm ; w_1=1320 turns; secondary coil: w_2=3600 turns, of which 600 turns (before sealing 100 turns) with d_{iz} = 0.38 mm, 3000 turns d_{iz} = 0.31 mm.

The current transformer 6 is converted from a - OSO-0.25 type transformer to 250 watts. The primary coil is not rewound. The secondary coil is made of LPRGS wire with a 6-mm diameter and has 36 turns. The voltage of the secondary coil is 12 v. The outlet is made for 6 v.

The double half-cycle rectifier 4 is made of 136 selenium discs with a diameter of 45 mm. Each section is made of 34 discs.

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The double half-cycle rectifier with a mean point consists of 30 selenium discs, 112 mm in diameter, joined in parallel, 15 to a section. The VSA-5 rectifier is converted from a selenium stack.

The filter in the voltage circuit consists of a choking coil (drossel) with L= 20gn and condensers KGB, with C= 6 microfarads, V= 600 v, which are installed before and after the filter, 3 each in parallel. *

The filter in the current circuit consists of 10 condensers KEG-2, connected in parallel with C= 2000 microfarads, V= 20 v.

* L, C, and V in Roman letters

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